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INDEX—CONTENTS

	Page
Editorial—The Rochester Convention	3
Proctor—Looking Backward and Forward in the Electroplating Industry	5
Phillips—Further Developments on Low pH Nickel Plating	16
Secretary-Treasurer's Report	21
Membership Record	24
Branch News	25
Applications	34
Elections	35
Suspensions	36
Resignations, Transfers, Deaths	37
Branch Directory	38

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VOL. XVIII JULY, 1931 No. 7

EDITORIAL

The Rochester Convention

The American Electro-Platers convention held in Rochester, New York, June 29-30, July 1 and 2 was opened with an address by the Founder, Mr. Charles H. Proctor. The Speaker reviewed the progress of the Society since its inception April 10, 1908, and pointed with pride and satisfaction to the many outstanding achievements of the organization from that time to the present. This splendid address by the founder was followed with a most interesting talk by Dr. Blum, Bureau of Standards, entitled "Summary of Researches of Electroplating at the Bureau." During the Speaker's remarks he informed us that approximately eighteen hundred questions were answered on electroplating throughout the year. Dr. Blum further stated that much research has been done by the Bureau, but also reminded us that numerous problems still remain unsolved, such as the control of Ammonia in Cyanide solutions, the pH of Chromium Solutions, and the anodic treatment of Aluminum and Duralumin. After this address, which was well received by all present, four very interesting papers on various subjects relating to cleaning and plating were presented. The first educational session was then brought to a close.

Every day during the Convention educational sessions were held.

On Monday Evening at 9:30 p.m., the Good Fellowship Club (International) invited all present, ladies included, to a reception and dance at the Eagle Club. This was an innovation in the way of

entertainment and was thoroughly appreciated. The consensus of opinion regarding the Fellowship Club seems to be that much good can be accomplished at future conventions by the members of this organization if their activities at Rochester are any criterion.

On Tuesday, June 30, after the Educational session which closed at 12:30 p.m. we started for Ontario Beach for an afternoon of fun. The group picture was first taken after which the annual ball game was held. George Gehling's platers were opposed by Bill Snyder's peddlers. According to the latest reports, it seems the "Cyanide Bill" team won by 9 to 6. The camera man was busy during the game and at the close of the banquet on Wednesday night, moving pictures were given showing the teams in action. Other pictures were shown which the movie man snapped during the afternoon; these brought smiles and applause, and the novel idea of the platers getting into the movies was thoroughly appreciated by the banqueters.

Dr. Blum presided at the round table discussion on Thursday morning. Although no official action was taken, this discussion was well worth while.

Mr. Hirsch spoke regarding the Bureau of Education, followed by a number of others who were interested in plating classes. It was interesting to note that one class during the year spent fifty-two lessons in the study of analysis of chromium solutions while another branch tried to undertake the job of analysing 12 different solutions in forty-five lessons. Most of those present seemed to be satisfied that longer time should be spent in the analysis of each solution and that the fundamentals of chemistry should be thoroughly explained at each lesson.

Another important subject mentioned at this session was the problem of speakers at branch meetings. At this discussion it was decided informally that branches make a mistake sometimes in expecting outside speakers to give "pep" to the meetings; the members not attending unless someone prominent in the Society is advertised as a drawing card. Mr. Hogaboom remarked very pertinently that good speakers could be found in every branch belonging to the local membership and further stated that developing these members would go a long way towards solving the speaker problem, and would strengthen the branch as well as adding prestige to the Society.

The final session of the convention was held on Thursday after-

noon at 2 o'clock. Mr. Philip Sievering, Newark Branch, was elected president. Mr. C. J. Griffin, Rochester Branch, 1st Vice-President; Mr. C. Marker, Detroit Branch, 2nd Vice-President; Mr. Gilbertson and the Editor were re-elected Secretary-Treasurer and Editor respectively.

The next convention city was voted upon with Los Angeles, Montreal and Philadelphia extending invitations to the Society to meet in 1932.

Philadelphia was chosen by a large majority. In connection with this item of business we were all pleased to meet Mr. M. Rynkofs representing the Los Angeles Branch. Here is a man full of energy and business ability. Everything that could be done to swing the convention into line for California in 1932 was done by Mr. Rynkofs and although the delegates, realizing the uncertainty in industrial conditions, and the distance to the Pacific Coast from a financial standpoint, voted against the proposition, they admire the courteous manner and sincere efforts of one of our youngest branch representatives and as Mr. Fraine remarked, "Come back to us again in two years when we expect things to be better, then we may be able to see our way clear to go to California."

The new officers were installed by Mr. F. J. Hanlon, Past Editor.

Dr. Blum presented the awards, the founders gold medal being awarded to Mr. Walter Barrows of Toronto Branch.

Thus was brought to a close the 19th annual convention of the American Electro-Platers Society.

LOOKING BACKWARD AND FORWARD IN THE ELECTROPLATING INDUSTRY

By Charles H. Proctor

It is with pleasure that I have an opportunity to address you on the subject of the electro-plating industry—Looking Backward and Forward; for of all the modern arts and sciences (for electro-plating is a science as well as an art) it is perhaps the least understood in the industrial world.

What I am going to say to you today will, I trust, prove of interest and profit to you, more especially so to those of my audience who are vitally interested in the commercial practice of electro-plating and desire to produce a uniform electro-plated deposit

on a standardized basis, at a minimum of cost under intensive production.

I have often wondered how many people realize, even those men who are actually engaged in the commercial practice of electro-plating day by day, that the early investigation of the deposition of one metal upon another was the forerunner of the wonderful development in electrical science of our modern every-day world; for without the aid of the electric current, first developed for electro-plating or rather electro-typing, there would be no telegraph, telephone or electro-motive power such as we behold today. The automotive industries would never have reached such stupendous proportions, because the hydro-carbon gases mixed with air and fired or exploded under compression, which develops the automotive power, could never have been controlled without electric methods, without the ignition developed by the electric spark. Over the mighty Rocky Mountains can be seen great transcontinental trains of steel, winding their way over the summits, as though drawn by an invisible power, all due to that magic fluid which scientists are unable to define, which we call electricity.

Our darkened world of night becomes almost daylight by its aid and man flies through the air faster than the fastest bird of creation. By its aid continents are united, space and time eliminated.

The future transportation of the world will be entirely carried by these methods and the waste in heat energy now used in transportation will be eliminated, for in the ages to follow conservation of the heat producing forces will be a part of the destiny of the human race.

Ages have passed since Zosimus, the Greek alchemist, first noted that copper could be reduced from its solution by the aid of iron. Paracelsus speaks of coating copper with silver and iron by simple immersion in a solution of their respective salts. What these ancient men of science beheld in their observations was the wooing of the positive iron for the negative copper, which in later ages proved to be the wedding of these two wonderful metals, and which was to become the great basic factor of dynamos and generators, which gave to us the modern world of electricity. The negative metal copper wrapped in her insulated folds and encircling the positive metal iron gives us the electrical energy to do with it as we may dictate. Yet we scarcely realize, among our modern world wonders,

what electricity really is. Without its aid radio with all its wonderful achievements could never have been possible.

The ancient Egyptians, thousands of years ago, knew of the affinity of mercury for gold, and used this combination for gilding their heroic bronze statues. They knew that by fire the mercury could be volatilized, leaving behind a coating of pure gold. After thousands of years we still use this same process and we call it "fire-gilding." The gilt buttons that adorn the uniforms of naval and military officers are gold plated by fire-gilding. Our own government and foreign governments still specify fire-gilt in their specifications to manufacturers, but there is no need to use the amalgam process, now that we can deposit gold to almost any thickness by electroplating under the correct conditions.

The French were, and are past masters in the art of fire-gilding, and many splendid examples of fire-gilding may be seen in our museums, the basic metal being brass or bronze. Even at present, in antique stores, may be seen splendid specimens of old-time French clocks beneath glass cases which were finished by fire-gilding. In many instances the finish was termed "Ormolu Gold," that splendid semi-lustre finish with the high lights in burnished relief.

The basis of our Ormolu Gold art metal goods, as we behold them in the jewelers' and art metal shops today, is spelter and antimonial lead cast in molds and fabricated, then heavily copper plated, the semi-lustre produced by immersing them in a mixture of sulphuric and nitric acids and then electro-gold-plating them, and finally hand-burnishing and lacquering. The basic metals for French Ormolu Gold finish were fine brass or bronze castings. The glass covers used were to protect the finish from atmospheric vapors. The celluloid lacquers of today were unknown when Ormolu Gold was first developed in the Seventeenth Century.

In 1799 Alexander Volta of Pavia (after whom the volt is named) developed the first continuous battery. Faraday propounded his laws of electrolysis in 1833-4. J. F. Daniell, professor of chemistry in Kings College, London, described the first constant current battery known as the Daniell's cell which was used quite extensively later.

Brugnatelli in 1805 first gilded medals by the electro-method, presumably using a solution of fulminate of gold, as cyanides as now used were practically unknown at that time. From that time

the art of electro-plating developed slowly, and little was accomplished until 1839, when C. J. Jordan, an Englishman, stated that it was possible, by the aid of a suitable battery, to deposit copper from a solution of sulphate of copper, upon wax previously coated with graphite. Thomas Spencer of Liverpool and also Jacobi of Russia laid claim to Jordan's discovery. Jordan used the process for making impressions of engraved copper plates and thus electrotyping was born.

It is believed that Jordan's process was the first actual commercial application of electro-plating. It was one of the most remarkable discoveries of the time and hundreds of persons were engaged in experimenting with the process. Men of wealth, and society dames, had their batteries and copper sulphate solutions and spent their leisure time in reproducing ancient coins, medals, etc., and in copper plating non-metallic substances for the amusement and edification of their guests. Alfred Smee, the well known English authority writing upon the subject in 1842, states: "There is not a town in England that I have happened to visit, and scarcely a street of this metropolis (presumably London) where prepared plasters are not exposed to view for the purpose of alluring persons to follow the delightful recreation afforded by the practice of electro-metallurgy. Jordan's process is used today. Metallized plaster art reproductions in endless variety may be seen everywhere in our art shops. However, in many instances of reproduction, fusible metal molds are used. The fusible metal melting at the temperature of boiling water, 212 deg. Fahr. or less, is easily removed leaving the copper coating intact.

Jordan's discovery greatly stimulated investigation in the art of electro-plating. Its possibilities appeared enormous from a commercial standpoint. It was the forerunner of silver plating and the commercial electro-plating industry as we know it today.

However, it was the discovery of the alkaline metals of sodium and potassium by Sir Humphrey Davy in 1807 that were to be the basic factors of modern cyanides that gave the greatest impetus to the electro-plating industry following Jordan's discovery.

The history of cyanides commences when in 1704, Diebach, a German manufacturer, obtained from a product called Dippels Oil, distilled from dried blood, bones and other animal matter or waste, a blue solution which received the name of "Prussian Blue" and for a long time the cyanide industry was limited to the prepara-

tion of this substance of unknown composition, used as a dye and a pigment.

The crystalline product obtained by treating "Prussian Blue" with caustic potash was then known as blood-lye salts. The nature of these bodies was first discovered by Lussac in 1814. He found that they were two compounds of a nitride of carbon (C_2N_2) to which he gave the name "cyanogen" (blue generator) and the salts became known as "cyanides." In the early days of the plating industry the old time plater of silver ware invariably made his own cyanide by heating yellow prussiate of potash and carbonate of potash to fusion in an iron pot. The results were a dark gray product of unknown cyanogen content. Platers of today should consider themselves fortunate in obtaining such a splendid American cyanide, such as sodium cyanide 51.32%, cyanogen 96.98%, or the equivalent of 120 to 130 lbs. Potassium cyanide based upon a cyanogen content of 34.36%, 94.96% sodium cyanide equivalent.

American cyanides are the best in the world and the platers should remember that it is the cyanogen that is the factor in cyanides and should purchase it upon its guaranteed cyanogen content. Foreign made cyanides do not come up to American standards.

It was the demand of the electro-plating industry that created the impetus for the production of cyanide upon a commercial scale. Millions of pounds are manufactured annually at Niagara Falls, New York. It might be presumed that the electro-plating industry was the largest consumer of sodium cyanide, but twice the amount consumed by that industry is used in the heat treatment and case hardening of steels used in the automotive and its allied industries.

Years ago the gold and silver mining industries consumed a large quantity of sodium cyanide in the recovery of gold and silver from their ores, but the flotation methods have succeeded the cyanide process. The production of hydrocyanic acid for fumigation in the orange groves, etc., is an important one. Sodium cyanide is used on an extensive scale for the making of Prussian blue and other dyes and pigments and in various other chemical products.

The period of successful electro-plating developed some time previous to 1840. Barrett took out a patent in 1838 jointly with the Elkingtons, the famous English silversmiths and electro-platers, who were previously engaged in gold plating military and other ornaments by dipping or immersing in a solution, which was patented by them. John Wright and William Milward are well known

names in connection with early silver plating. They were co-workers of the Elkington Brothers. Up to 1838 or 1840, all plating had either been done by dipping or the well known method of "close-plating" which was nothing more than soldering or sweating thin sheets of gold or silver upon a base metal. In the early part of the nineteenth century the method of close plating was used extensively in the manufacture of the well-known "Sheffield Plate," sheets of silver soldered to a copper base and fabricated into all sorts of utensils for the wealthy of that period. For many years close-plating was used on the metal parts of horses' harness, etc., when silver plated harness was called for. I believe there is still a firm in Newark, N. J., that does close-plating or there was a few years ago.

Out of the method of close-plating was finally developed our modern rolled plate, two thin sheets of gold soldered to a base metal. We are all familiar with the term rolled gold as applied to watches and jewelry. The production of duplex metals of copper and steel is a similar process. The impact method of welding and rolling is used. Platinum and gold are united in a similar way, the adhesion being maintained by the impact of rolling between steel rolls.

The Elkingtons used the first silver cyanide solution following the patent granted them March 25th, 1840. It was the foundation of the silver plating industry of the world and the real beginning of the modern art of electro-plating.

The same type of silver plating solution is used today, but the battery has been replaced by the modern dynamo, which gives the volume of current necessary for operations upon a tremendous commercial scale in modern electro-plating.

The development of the modern dynamo used in plating and power generators as we know them today with their tremendous future possibilities had their birth in the magneto electric machine of Woolrich. The first machine was dated February 22, 1844. It was manufactured by Prime and Son of Birmingham, England. This was the first electro-magnetic machine used in electro-plating. It still exists. It has been saved to posterity and now stands in Aston Hall, Birmingham, England, a museum of historic interest and formerly the ancestral home of Sir Thomas Holt.

It was shortly after 1840 that the silver plating industry was first inaugurated in the United States. The famous Rogers Brothers

were the progenitors. Other well-known names could be mentioned as the developers in American electro-plating industry.

The world famous trade mark "Rogers Brothers, 1841. Guaranteed 12 Dwts." is now controlled by the International Silver Company, Meriden, Conn. Twelve Dwts. is a standard silver deposit as triple plate.

There are many descendants of the Rogers family still employed in the silver plating industry in Connecticut. Many of them started in business for themselves in later years.

In Connecticut's plating industry, son followed father in charge of the plating departments. This may account for the so-called trade secrets and mysteries that surrounded electro-plating for many years, but secrets no longer exist in the electro-plating industry. Father handed his processes down to his son and so it continued, but in the light of chemistry and modern investigation of the plating solution, there is no trade secret or mystery. They were as myths of the Middle Ages, which like the witchcraft of Salem, were only a superstition. The secrets that remain to the American plater are the secrets to solve his problems in the light of scientific facts, to control his solutions from a chemical standpoint, to control his deposit according to the laws of Faraday inculcated by Volta, Ampere and Ohms law, to produce a product upon a standardized basis at the lowest cost of manual labor and material. These are the modern secrets of commercial electroplating and other industries. The time has come when standardized methods in all lines of American industry must replace the cut and dry, rule-of-thumb methods of years ago and the American Electro-Platers' Society stands squarely for progress in its own field of endeavor.

If you have no standards, create them. The American electroplater from now hence must produce efficiently and economically because his employer will have to guarantee that his products conform to a definite standard in the near future, even as "Roger Brothers, 1841. 12 Dwt." is a standard guarantee to the consumers of silver plated steel knives that the product is all that it is represented to be. It can be done, it must be done. Unfortunately there has been no recognized standard created for metal plated deposits except silver and to some extent, zinc and cadmium plated deposits.

Dr. Isaac Adams of Boston, Mass. is the sponsor for modern

nickel plating. He patented the use of the double nickel salts of nickel and ammonia about 1864, and its use was commenced upon a commercial scale almost immediately. The results are, with some modifications, such as the use of single nickel salts, nickel chloride and boracic or acetic acid, the basis for modern electro nickel plating solution of today.

Nickel as a deposit, as we all know who are familiar with the metal, is hard and offers great resistance to wear, gives a splendid lustre under proper manipulation, and is one of the great commercial metals, that is practically unacted upon by atmospheric corrosion, and so it is universally used as a finish and protective coating for the ferrous and non-ferrous metals and is the true basis when correctly applied for all chromium plated deposits.

However, nickel does not protect steel from rusting. It matters not how heavily the nickel deposit may be applied, even though the steel may have been fairly heavily coated with a basic coating of copper. Cadmium and zinc are the metals par excellence to protect steel from rust and atmospheric corrosion. These truly splendid commercial metals are used more extensively in America than in any other country as a protecting factor against the grim destroyer of all ferrous metals—rust.

Attempts have been made to replace nickel with cobalt at frequent intervals, but so far the latter metal has not come into commercial use. Some platers, however, add cobalt to their nickel solutions to increase its hardness and lustre against atmospheric conditions.

Professor Boettger in 1842 visualized the possibilities of nickel plating. He pointed out that dense and lustrous deposits of nickel could be obtained from its double salt of sulphate of nickel with sulphate of ammonia, as well as from ammoniacal solutions of sulphate of nickel. That such deposits on account of their great hardness, slight oxidizability and elegant appearance were capable of many applications. Boettger's statements fell into oblivion and only in later years when the execution of nickel plating was taken up in the United States by Adams were his labors in connection with nickel plating, deposition of iron, cobalt, platinum and the production of various patinas, remembered in Europe.

I might also mention that De Roulz first succeeded in depositing metallic alloys; for instance, brass and bronze, from solutions of the mixed metallic salts of copper and zinc and Russel & Woolrich

in 1849 obtained patents on cadmium and brass plating solutions.

To Roseleur, the eminent French electro-plater and authority, we are indebted for present-day formulas for cyanide copper, brass, bronze, gold and other solutions. With slight modifications based upon modern practice his formulas are still used today.

There are many illustrious names besides those already mentioned, who have aided in the science of electro-plating, Becquerel, Heiran, Elsner, von Leuchtenberg, Meidlinger, Whale, Goode, Christofle, von Kress, Thompson and Gaiffe. In the past years members of the American Electrochemical Society have accomplished much for the electro-plating art. Such names as Bancroft, Watts, Mathers, Ferguson, Carveth, Curry and Sargent are well remembered for the part they have played in the modern development of chromium plating.

The Bureau of Standards, Washington, D. C., under the direction of William Blum, has accomplished much for the art and well-known members of the American Electro-Platers Society are doing their share to raise the standard of the profession and standardize methods for control of solutions and deposits. It would seem that as the Bureau of Standards was developed for creating commercial standards, the Bureau can do much to assist in creating commerical standards for electro-deposits.

Longfellow said, "Art is long and time is fleeting," so it may be necessary for individual firms to work out their own standards than waste the fleeting time Longfellow mentions. It is my opinion that the great industrial plants in America must create and work out their own standards for their own benefit under their own productive conditions.

The art of electro-plating was more or less directly developed by cut and dry rule-of-thumb methods, which resulted in our present practical processes developed after long years of effort and experiment. What is now needed to supplement the valuable experience gained by the practical man is clear cut scientific investigation of all of the facts with which the electro-plater has to deal in intensive modern everyday commercial production of electro-plated goods.

We should know as far as humanly possible, exactly why and wherefore the plating solutions work as they do. When they are supposed to be right why do they go wrong. If they are right in the beginning then why not keep them so continuously. It can be

done. It is an absolute fact without dispute or question that if we can produce certain results from an electro-plating solution made from known chemical proportions and composition, today or tomorrow, and if such a solution is controlled both chemically and electrically, then the results we obtain should always be uniform, the deposit of metal the same.

When we can do this we have created a standard. Until we do create standard methods for preparing the solution, for replenishing the solutions, for electrical control of the solutions, for the weight of metal to be deposited upon a given surface from such a solution, we have no standards and we still remain in the same ditch. Standardized methods must replace guess-work and rule-of-thumb. It can be done. It is already being done, to some extent as outlined. But to accomplish these much desired results the chemist must be combined with the practical electro-plater. They must be one unit. The one must be the handmaid of the other. The field is large enough for both, however, if they work hand in hand together, the chemist and the electro-plater. Petty jealousies must be eliminated. Give the chemist a chance to help solve your problems if you do not want to take up chemical training, let him help to create standards. We cannot know too much about electro-plating. What the plater needs is a thorough understanding of electro-chemistry. That is the basis of his profession—chemistry and electricity. Anyone can dissolve known materials in water. It is what is obtained from the plating solution in commerical products that counts.

A more intimate knowledge of chemistry and physics is what is desired. All future platers in the generations to come must be electro-chemists. The more knowledge we can gain about our respective professions, the more valuable we become as producing factors. It takes the combined experience of the thoroughly practical man and the theoretical knowledge of the chemist to produce efficient results in electro-plating, if we desire to get near the 100 per cent mark. Let us combine the knowledge for we shall find it necessary to do so in every line of commercial industry to produce goods at the minimum of cost not only in time, but in labor and materials. But in the future the consumer will demand a guarantee that the product is as it is represented to be, which must be a gold bond guarantee of the electro-plated product's wearing qualities.

To my interested listeners who are concerned in better products in the plating industry, more uniform methods, less waste at a lower cost, these are the secrets that must be learned in the plating industry, these are its future as learned from the past.

1. Develop a known standard for the weight of metal to be deposited on the surface area of your product.

2. Then develop the most efficient type of plating solution that will give you the results you want in the shortest time possible at the minimum cost of time, labor and materials.

3. When plating solutions are so prepared from known proportions and prove to be efficient solutions, then maintain them as standard solutions by standardized methods of replenishing to maintain them in continuous working condition. This means chemical analysis at defined periods.

4. Determine the surface area of your product per tank load. The amount of metal to be deposited according to your standard, the amperage supported by the voltage and the time required for such a deposit.

5. Maintain absolute electrical control of solutions as near as possible by volt and ampere meter and if necessary the ampere hour meter, all solutions to be separately controlled with thermostatic temperature control when necessary.

6. After you have once prepared an efficient standard solution that you can designate as a standard, then each work day make an analysis of the solution or at least once a week to determine its deterioration; how much metal has been reduced from the anode, how much lost from the solution, the decomposition of the chemical, how much solution is lost each day, by which is meant everything soluble in the water (dragout). When you know these things, you can replace them, they must be replaced to make your plating operations continuous. It is easy to see that there is work to be done by the chemist as well as the plater when the facts as outlined are understood.

7. There are only two types of solutions that will give a cathode and anode efficiency at near the 100 per cent mark. They are the silver cyanide and copper sulphate solutions, but they must be efficiently prepared and as efficiently maintained to give such maximum results.

All other types of solutions are somewhat less efficient but they

can be prepared and maintained so they will give close to the 100 per cent mark. Hydrogen is a factor that must always be considered when working out electrical control of the solution. The loss of current in hydrogen must be figured out by comparing the current factor in amperes in proportion to the metal deposited from a definite amperage.

When you have created standards, then you eliminate waste. The days of cut and dry rule-of-thumb are going forever. They must go if we are to maintain commercial supremacy in the industrial world in our own country, these United States.

Unfortunately competition is the destroyer of "standards." More especially is this true during the present period of depression. With all the knowledge we now possess in chromium plating on a commercial scale, with a chromium metal cost of one-half that of nickel based on nickel anode cost, there are firms which chromium plate their products in the hardware industry finding it necessary to limit the time of plating the products to ten seconds expired time due to competition in selling prices. In two plants recently visited the expired plating time by my own watch was nine seconds. On the other hand in a plant in the east where golf clubs are their specialty their standard chromium deposit is two hours. There must be some difference in the selling price of golf clubs as compared with hardware.

Time and money are great indisputable factors and will still remain so in the future even in the electro-plating industry. With all the united efforts to create "standard deposits" the dollar will be the deciding factor.

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*FURTHER DEVELOPMENTS ON LOW pH NICKEL PLATING

By W. H. Phillips

Gentlemen, sometime ago I presented a paper on low pH before this Society. Since that time, there have been a few further developments, and I would just like to bring you all up to date, from a more or less practical standpoint.

We have had considerable experience in running the low pH bath. We have about 60,000 gallons in operation in the General Motors Corporation, and there is probably a like amount outside of the General Motors in the Detroit District. Outside of the district, I don't know just really what has been done.

*American Electrochemical Society, Birmingham, Ala., meeting.

One of the first things that was rather interesting as we went into the development was a series of tasks that we really made to find out what distribution of copper and nickel we should make if we were going to make the deposit .001" thick. So we tried a different series of those tasks, and these were the panels here.

Now, in the first case, these are nickel only. There is a thousandth of nickel. The ones right here have a pH of 2.5, and these a pH of 5.8, and these (indicating a pH of 2.5).

I am going to pass these around, and you will notice that the low pH panels, for some peculiar reason, turned out the best. We sent those panels down to Florida for thirty days, and then exposed them for 200 days on the roof of the Research Building in Detroit, so they have had quite an exposure.

In the next group, we have a different distribution. Nickel is one quarter of a thousandth; copper, seventy-five hundredths of a thousandth. And again, the low pH panels, as I say, for some unexplained reason, come out the best.

In all cases, the chromium is the same; it is two ten-thousandths. We don't know whether we should conclude or not that the low pH gives better protection, but that is what those panels would indicate.

Now, another thing that may prove interesting was the fact that it was supposed that the low pH produced a harder deposit, so we made some micro-character tests to determine if that was so. We found it was so. Micro-character readings are pretty hard to make, but these were about as important as any bunch we could get. In the first case, we used a temperature of 130° F all the way through, and we varied the pH, beginning at the top, 6, 5, 4, 3, 2. I will read these:

pH	*Micro-character reading*
6.0	8.3
5.0	8.66
4.0	7.16
3.0	7.98
2.0	8.28

Now, in the case of temperature, we took a pH of 5.

Temperature (F)	*Micro-character reading*
100	6.54
125	6.90
150	7.56
175	9.65

Now, you appreciate the increase in those readings indicates increased softness. The scratch is wider. So that the temperature at 5 pH made a tremendous difference in the softness. The high temperature produced the soft nickel. We tried the same thing at 2 pH, with the following results:

Temperature (F)	*Micro-character reading*
100	5.64
125	6.46
150	9.38
175	10.61

Before anybody else tries to flag me I will say that there is a discrepancy right there, because at 150° in the previous table, we got 7.6, and down here we got 9.38. Nevertheless, we simply attribute that to experimental error. And I may say that these are average readings. As we print the paper, we are going to give all the results, and you can make all your own averages, if you want to.

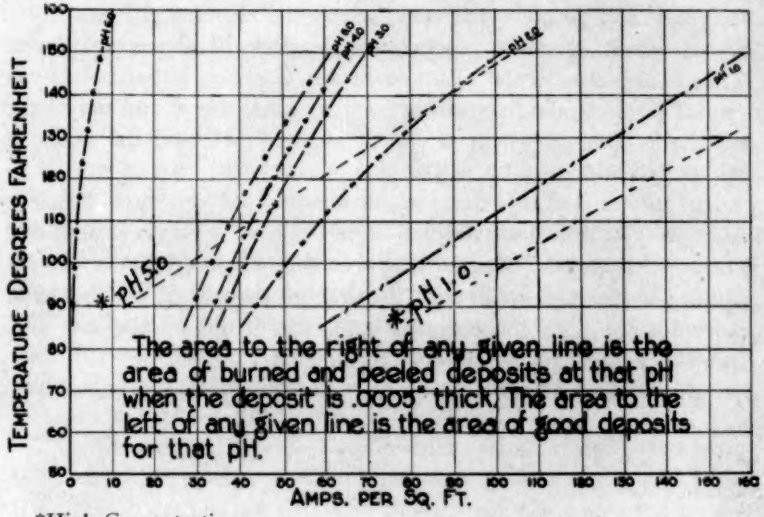
Now, I may say, as I do in the paper, that this question of hardness, from the buffer's standpoint, is usually a question of roughness. It isn't hardness at all. If the plate is smooth, the buffer pronounces it soft. If it is rough, he will pronounce it hard. So that these micro-character tests don't mean that if you get a scratch at 9.7, the buffer is going to come in and pat you on the back for making a nice plate. He may come in and tell you that it is awful hard. If it is rough, it will be hard for him to buff. The point in that is that you have got to be awfully careful, running at these high rates of speed that the low pH and high concentrations make possible, to keep the work smooth. I think bagged anodes are an awfully good thing. They seem to help. Anything that keeps the solution clean seems to be a good thing. Proper filtration is another good point, and of course, as I pointed out in the original paper, at 3 pH or lower, the solution is clear.

Now, it became a question, almost immediately after the publication of this paper, whether or not you couldn't get the same results by increasing the concentration of the nickel salts. So we prepared some test runs, using 400 grams per liter of single nickel salts, against some 250 which we had used in our original experiments. We found out we did get quite a spread. Now, here are the original curves at 250 grams per liter. Here is 6 ph, 5, 4, 3, 2 and 1. Now understand, all the good plates are over on the left side.

Now, in our concentrated bath, 5 pH came way over here (indicating)—that is, 400 grams per liter. But it went way over here (to the right), meaning that you have got that area to work in, which is greater than 5 pH there is. There is more area on that side. However, you will notice the effect of temperature there. We tried down there at 90; the high concentrated bath doesn't work as well as the low one does at 90. But as you go over here, get to 110, conditions reverse, and keep right on doing that.

Now, if you take 1 pH in the high concentrated bath, well, you just have almost all the area there is. It takes in most plants. And that gives you a choice there of operating conditions.

DEPOSITS .0005 IN. THICK


TEMPERATURE DEGREES FAHRENHEIT
AMPS. PER SQ. FT.
*PH 5.0
*PH 1.0
The area to the right of any given line is the area of burned and peeled deposits at that pH when the deposit is .0005" thick. The area to the left of any given line is the area of good deposits for that pH.

*High Concentration

I may say that these charts are simply proven by these panels. I would be glad to have anyone, or all of you, examine those at your leisure. You can see that we didn't make up the figures, because we have the panels from which we took them.

Now I am just going to say a few words regarding the tactics that might be used in picking out which of those baths you might use for a particular job. There are advantages on both sides. One of the advantages of the high concentration—relatively high pH,—

that is, you don't want to go too high even with the concentrated bath if you want to plate rapidly. If you are willing to plate slowly, around 10 amperes or thereabouts per square foot, all right; go on up. If you want to plate rapidly, 5 is about the first place, or 5.5, that you would want to choose, probably. You have more throwing power in that bath than you have in the lower concentration, lower pH bath. So that in certain objects, you might want to sacrifice certain of the conditions or certain of the advantages that you would have the other way. You can, however, get a pretty satisfactory throw for most pieces in the 250 gram per liter bath, and as low as 1 pH. The Cadillac Motor Company are plating practically all the pieces they put on the car through a conveyor tank under conditions of that kind. In checking their bath just before I came on, I found it below 1.5 pH. One of the reasons they can do that is that it is a large conveyor tank, where the electrode distances are great, which somewhat overcomes the lack of throwing power. That is also true at the Oakland Motor Car Co., but to a less extent. The electrode distances are not so great there, and they have two baths, one of which is run at about 3 pH, and the other in the neighborhood of 1.5.

But just to sum this thing up, on the low pH you have the clear solution, you have the relatively light dragout. (You see, with 400 grams per liter, your dragout is appreciable. I figured that on for instance a thousand bumper bars, the dragout costs $1.50 per thousand more for the high concentrated bath than it did on the low one. But you might have advantages to offset it.)

I think that covers the situation, as far as we have gone with it.

SECRETARY-TREASURER'S REPORT

To the Branch Secretaries, Presidents and Delegates,

Greetings:

Enclosed find report of the Secretary-Treasurer's office for the fiscal year of 1930-1931. An analysis of the financial conditions of the organization is hereby given to clarify the report. An examination of the finances will disclose that we have expended $1,419.79 in excess of our receipts. This deficit would ordinarily seem alarming, but as the greatest part of it is caused by the expense of the Research Meeting held in Chicago in January, 1931, there is no cause for worry. The cost of this meeting was:

Executive Officers' and Research Committee's mileage	$721.78
Reporting and printing proceedings	207.20
	$928.98

However, with this expense subtracted from the total deficit for the year, we will still have a deficit of $490.81, but if the $531.58, the balance due the Society from the branches, had been paid when due, it would more than offset this deficit and would not show on the report. Inasmuch as this expensive Research Meeting at Chicago will not have to be repeated for several years, we will not have to face this expense very soon. With careful consideration in making expenditures for the next year, we shall be able to build up our treasury so that we will have a safe balance.

The membership report shows a total gain of thirty-seven members, which represents a natural and good growth, especially under the present depression and also in view of the loss of members through the following channels:

Resignations	16
Suspensions	71
Deaths	10
	97

At this time I wish to thank the branch officers for their efficient reports and their promptness in answering communications. The

task of secretary-treasurer has been lightened by this splendid co-operation.

Very truly yours,

H. A. GILBERTSON.

AMERICAN ELECTRO-PLATERS' SOCIETY

Statement of Cash Receipts and Disbursements
Year Ending May 31, 1931

PARTICULARS		AMOUNT
Receipts:		
From branches (see schedule attached)	$2855.36	
Per Capita Tax	2855.36	
Sale of Convention Reports	99.52	
Sale of Supplies	29.71	
	$2984.59	
On Sale of Convention Reports to Members	322.05	
Donation from Baltimore-Washington Branch	150.00	
Of Interest on Bank Accounts	43.92	
On Sale of MONTHLY REVIEW	5.10	
		$3505.66
Disbursements for:		
Printing and mailing MONTHLY REVIEW	$2134.92	
Convention reporting, printing of reports, letters, etc.	881.10	
Officers' Mileage	811.58	
Incorporation Expenses	263.15	
Officers' Salaries	250.00	
Office expenses of—President	90.22	
Editor	37.91	
Secretary-Treasurer	146.06	
Printing and reporting proceedings of Chicago Research Meeting	207.20	
Supplies for sale to branches	58.95	
Stationery for Educational Committee	6.86	
Expenses of conferring Honorary Membership on Dr. E. Weston	22.50	
Sundry Expenses	15.00	
		$4925.45
Excess of disbursements over receipts		$1419.79

Recapitulation:

Cash on hand June 1, 1930	$2362.52
Cash receipts	3505.66
	$5868.18
Cash disbursements	4925.45
Cash on hand May 31, 1931	$942.73

Collections and Balances of Branch Accounts Receivable
June 1, 1930 to May 31, 1931

BRANCH	*Per Cap. Tax*	*Conv. Repts.*	*Supplies*	*Balance Due 5-31-31*
Anderson				$11.55
Baltimore-Wash.	$63.00	$3.65		22.50
Boston	64.06	3.65		1.17
Bridgeport	100.27	3.65	$6.00	35.85
Chicago	475.66	3.76	3.00	7.14
Cincinnati				69.88
Cleveland	61.95	3.71		21.39
Dayton	76.13	3.71		1.38
Detroit	129.68	3.67		45.81
Grand Rapids	66.17	3.67	1.23	
Hartford-C.V.	95.54	3.65	1.68	
Indianapolis	38.85	3.67	.72	1.20
Los Angeles	193.73	7.81	1.50	3.06
Milwaukee	149.95	3.70		1.92
Montreal	30.96	3.73		9.73
New York	264.62	10.84		4.11
Newark	129.15	3.63		137.49
Philadelphia	269.33	3.63	4.14	
Pittsburgh	70.47	3.67	1.00	1.20
Providence	54.98	3.65		35.95
Rochester	120.24	3.63		45.16
St. Louis	65.10	3.70		64.48
San Francisco			2.53	8.33
Toledo	75.09	3.71	3.10	
Toronto	132.83	3.73	2.16	.87
Waterbury	72.46	3.65	.60	1.41
Worcester	55.14	3.65	2.05	
	$2855.36	$99.52	$29.71	$531.58

Membership Record
June 1, 1930 to June 1, 1931

Branch	Total Members June 1, 1930	Elections	Reinstated	Gain by Transfers	Loss by Transfer	Suspended	Died	Resigned	Total Members June 1, 1931
Anderson		23							23
Baltimore-Wash.	34	6							40
Boston	30	5						1	34
Bridgeport	63	3		2					68
Chicago	220	15		1	2	13	1	1	219
Cincinnati	31								31
Cleveland	41						2	1	38
Dayton	37	2				3			36
Detroit	83	8				6		1	84
Grand Rapids	33	3				3			33
Hartford	45	3				1		1	46
Indianapolis	23	1			5	5			14
Los Angeles	92	5		1	1	4			93
Milwaukee	57	1				4			54
Montreal	21	1				5			17
New York	122	6	1		2				127
Newark	120	8	4		2		1	1	128
Philadelphia	131	11			2	7	3	2	128
Pittsburgh	44	2				9			37
Providence-Attleboro	33	1				1		1	32
Rochester	75	6		1	1		1	2	78
St. Louis	62				1	4		1	56
San Francisco		15							15
Toronto	65	1				1	1	1	63
Toledo	28	1							29
Waterbury	34	9				1		3	39
Worcester	25	3				4			24
Totals	1549	139	5	5	16	71	9	16	1586

BRANCH NEWS

NEW YORK BRANCH

President, Ralph J. Liguori; Vice-President, John Rolff; Secretary-Treasurer, John E. Sterling; Recording Secretary, Joseph Musante, Jr.; Sergeant-at-Arms, Fred Muschler; Assistant Sergeant-at-Arms, Samuel Goldstein; Librarian, N. Fleiderbaum. Trustees: G. A. Wilson, Elias Schor, A. Henry. Delegates: J. E. Sterling, F. Haushalter, G. A. Wilson. Alternates, E. Schor, J. Musante, Jr., N. Fleiderbaum.

JOHN E. STERLING.

MILWAUKEE BRANCH

The following were elected officers, June 1, 1931, to June 1, 1932:

President, M. Nishuitz; Vice-President, Paul Krause; Secretary-Treasurer, F. Marx; Librarian, H. Binder; Assistant Librarian, A. Kochler. Board of Managers: R. Steuernagel, Ed. Werner, J. Geissman. Delegates to Convention: Ed. Werner, R. Hunt, Paul Krause. Alternates: J. Andryski, Jos. Bykowski, A. Brown.

J. N. HOCK, *Secretary-Treasurer.*

LOS ANGELES BRANCH

The regular monthly meeting of the Los Angeles Branch was held as usual the second Wednesday of the month, May 13, 1931, on the 9th floor of the Chamber of Commerce Building. The meeting was called to order by President E. W. Francis at 7:15 p.m. Minutes of the previous meeting were read and approved. Communications were read and recorded. Two new members were elected to the Los Angeles Branch: James L. Dye, 145 W. 93rd St., Los Angeles, Calif., and Frank H. Slater, 1819½ N. Western Ave., Los Angeles, Calif. The committee reported on the progress of the Los Angeles Branch, extending the hand of comradeship to the various branches, rank and file as well, to hold their 1932 Convention in this city.

The officers elected or re-elected were as follows: President, re-elected, E. W. Francis; Vice-President, elected, Ben Foss; Secretary-Treasurer, re-elected, M. D. Rynkofs; Librarian, elected, Earl Coffin; Sergeant-at-Arms, elected, N. A. French. Board of Managers: Elected, C. G. Spence, C. E. Thornton, E. R. Williams.

The meeting was turned over to the Librarian, who found the following in the question box:

Question—How can I plate green gold such as used on plumbing fixtures?

Answer—Use the following formula: 10 pwts. of gold chloride, 1½ pwts. of silver chloride, 1 pwt. of lead carbonate, 8 ozs. sodium cyanide, 1 gal. water. Current pressure 5 to 6 volts and temperature normal.

Question—When an electric cleaner and copper strike gets sluggish and fails to gas properly, what is the matter? The solution was made of copper carbonate, sodium cyanide, caustic soda, soda ash, and tri-sodium phosphate, 1 oz. each to the gallon.

Answer—Take copper anodes out and add caustic soda.

Question—What causes acid copper to form a grease scum on top?

Answer—Work is not cleaned.

Question—What is the new non-tarnishable silver?

Answer—To be investigated.

Question—How can screws, nuts, and pins be plated in a basket in a chromium solution?

Answer—See May REVIEW.

Question—What method is used in coloring aluminum in red, blue, and other colors?

Answer—Several theories advanced. Discussion laid over for next meeting.

After the questions were disposed of, Mr. S. Fischer gave a fine talk on "Trivalent and Iron in Chromium Solutions." His talk was enjoyed by all present.

The meeting adjourned at 10:45 p.m.

M. D. RYNKOFS, *Secretary.*

The regular monthly meeting of this Branch was held as usual the second Wednesday of the month, June 10, on the 9th floor of the Chamber of Commerce Building—thirty-one present.

New officers for the ensuing fiscal year were installed. Brother M. McNulty acted very creditably as master of ceremonies; Mac is a past master in these affairs, having a natural dignity.

Mr. C. R. Robertson and his beautiful daughter plater of Ontario, Calif., were present. Mr. Robertson presented his application for membership. Messrs. Rushton and Robinson saw to it that the fair plater was made at home. At first it was noticeable that some of the bald heads, like Francis, Thornton, Merigold, and a few others, were trying to look young. R. A. Solivan, formerly of the Philadelphia Branch, was present also.

There was considerable discussion regarding whether or not L. A. Branch would get the 1932 Convention. A large number of eastern members have written in favor of the Convention; some few against, mostly because of distance. Yet distance today means little.

The Los Angeles Chamber of Commerce is sending their representative, Mr. H. H. Main, to Rochester to assist Delegate Rynkofs in trying to secure the 1932 Convention for Los Angeles. Also the Santa Fe R. R. will have a representative at the convention.

Meeting was adjourned at 10:00.

M. D. RYNKOFS, *Secretary-Treasurer.*

HARTFORD-CONNECTICUT VALLEY BRANCH

The Hartford-Connecticut Valley Branch held their regular monthly meeting on Monday evening, May 25, at the Hartford Chamber of Commerce, 805 Main St., Hartford, Conn.

The meeting was called to order at 8:30 p.m. with President Beloin in the chair. Minutes of the previous meeting were read and approved. All communications were read and placed on file. All bills were voted paid.

Under new business, three active members were voted suspended for nonpayment of dues. They were Mr. Geo. Dix, Wethersfield, Conn.; Mr. Chas. Lane, Springfield, Mass.; Mr. M. F. Flavin, Springfield, Mass.

Our annual election of officers was held, and the following were elected: President, Edw. Fleming, Terryville, Conn.; Vice-President, T. J. Murray, Springfield, Mass.; Secretary-Treasurer, V. E. Grant, Bristol, Conn.; Librarian, W. E. Seidel, Holyoke, Mass. Board of Managers: H. R. MacFadyen, Geo. Vibberts, W. J. Kennedy. Delegates to National Convention: W. J. Kennedy, W. E. Seidel, W. J. Jordan. Alternates: Jas. E. Beloin, V. E. Grant, Edw. Fleming.

After the new officers had been elected and resumed their stations, President Fleming introduced Mr. C. G. Rising, assistant superintendent of the National Blank Book Co., of Holyoke, Mass., who gave a very interesting account of the history and growth of "The Development of Loose Leaf Devices."

Mr. Rising's talk was very interesting, as it covered a great number of various kinds of work in the process of turning out the hundreds of different parts used in the making of blank books and their parts.

He described many of the difficulties encountered and how they were overcome. He also had many samples of the different kinds of books, which were passed around for inspection.

Mr. Rising's talk was very much enjoyed, and in conclusion he was given a rising vote of thanks.

The meeting was attended by eighteen members and visitors and adjourned at 10:30 p.m.

V. E. GRANT, *Secretary.*

WATERBURY BRANCH

Owing to the threatening weather, the June meeting of Waterbury Branch was slimly attended. Leroy Miller, newly elected president, presided at the session. A short discussion on the subject of "Cleaners," followed by remarks on a number of plating-room problems, helped to pass a pleasant evening.

Newly elected officers of Waterbury Branch are: Leroy Miller, President; Vice-President, Andrew Perrin; Secretary-Treasurer, Wm. F. Guilfoile; Librarian, Wm. Cavanaugh; Assistant Librarian, Ellsworth Candee.

Supreme President George Gehling was a recent visitor in this city, and whilst here visited the plants of the American Brass Co., Plume & Atwoods,

and the Patent Button Co. Waterbury, known as the "Brass Center of the World," has on exhibition in the Winan railroad station an extraordinary exhibit of metallic articles made and finished in this city. President Gehling, in looking them over, suggested that they be borrowed and forwarded to the Supreme Convention, where he felt sure several prizes would be awaiting them.

W. F. GUILFOILE, *Secretary.*

BOSTON BRANCH

The regular meeting of Boston Branch was held Thursday, June 4th, at the American House, with President Gale in the chair.

The minutes of the previous meeting were read and approved. Two new members were admitted and one application was received.

The election of delegates to the Rochester convention was put over for two weeks.

Mr. Campbell of the chemistry class made his report. He made an excellent report of the progress the students were making in their studies; and that every one of the members were present at all the meetings of the class, and it was felt that they were amply rewarded, for the progress made in their studies stimulated them all to new zeal to understand more of the mysteries of chemistry, pertaining to the science of electroplating.

The class at present are using Sizelove's "Platers' Guidebook" as a text book, under the able instructions of their teacher, Mr. Cahill, who is in hearty co-operation with every member of the class.

Financially the class was in excellent condition, and all expenses were met cheerfully by the members, which were $429.25 at the close of the term. A vote of thanks was given the committee, Mr. Campbell, Mr. Lee and Mr. Hardy, for their good work in forming the class.

The new officers for the following year are: President, L. Gale; Vice-President, C. Hardy; Financial Secretary, A. Garrett; Sergeant-at-Arms, I. Ober; Librarian, F. Mackie. Board of Managers: C. Campbell (chairman), B. Lee and F. English.

We had with us our old friend Mr. Frank Clark, who gave us a very interesting account of one of the chemical classes he had visited in his travels, whose laboratory was not only equipped for chemical analysis but also for practical demonstration of electroplating, it being equipped with a plating outfit in miniature, with ample current, rheostats, volt and ampmeters, where every factor in the plating industry could be tried out and demonstrated to the satisfaction of the student.

Our new member, Mr. I. H. Ober, gave us an intellectual treat by reciting for us two poems, one "The Haunted House" and the other "Butter Side Down," which were well rendered and pleased every member.

As there was no more business, the meeting adjourned until the first Thursday in September.

Yours truly,

A. W. GARRETT, *Secretary.*

CHICAGO BRANCH

The regular monthly meeting and annual Smoker of Chicago Branch A. E. S. was held Saturday, June 13, 1931, at the Atlantic Hotel.

Meeting was called to order with President S. J. C. Trapp presiding, Vice-President J. J. Witte absent, all other officers present.

Mr. O'Connor of the American Brass Works of Kenosha, Wisc., division presented a two-reel movie, entitled "From Mine to Consumer," which was very interesting.

A rising vote of thanks was given to Mr. O'Connor and he invited all the members to visit the plant when in Kenosha.

After the regular routine of business had been transacted, and the election of Mr. George A. Kain, Jr., and Mr. Charles H. Craig, to active membership, President S. J. C. Trapp called upon Mr. F. J. Hanlon to act as Master of Ceremonies, with the assistance of Mr. Willmore as Marshal, to install the newly elected officers which are as follows: President, J. C. Kretschmer; Vice-President, Thos. Kennedy; Secretary-Treasurer, E. G. Stenberg; Librarian, O. E. Servis. Board of Managers: Fred Herbst, Chairman, C. S. Tompkins, Gus Jelinek.

The newly installed President was then presented with the gavel and appointed Wm. Glomski Sergeant-at-Arms.

The evening was enjoyed by everyone and owing to the late hour the Question Box was held over until the next meeting.

E. G. STENBERG, *Secretary.*

CLEVELAND BRANCH

Cleveland Branch held its monthly meeting on Saturday evening, June 6, at Hotel Winton, President E. Steen Thompson presiding.

The minutes of our May meeting were approved as read.

A Motion was carried that we omit our July meeting.

A Motion was carried that the Branch hold a picnic at Puritas Springs park, on Sunday, August 9.

The Chair appointed Mr. Singler and Mr. Zadowski to act as a committee. They promised a good time for everybody.

Our Librarian not being present we had general discussion of plating problems.

A Motion to adjourn was carried at 10 p.m.

PAUL STAMM, *Secretary.*

BRIDGEPORT BRANCH

Meeting May 5, 1931, opened at 8:30 p.m. Minutes of last meeting read. Voted to be accepted as read. Roll call of officers. All present, with lone exception of Mr. H. Braun, librarian, absent.

Report of Committees: A tentative report was read by the banquet committee, which showed a profit from banquet of approximately $250.00 (to date). More receipts are still due. Sick Committee reported on one on sick list.

Annual Election of Officers: The result of the Annual Election is as follows: President, Mr. J. Sexton, 61 Trumbull St., West Haven, Conn.; Vice-President, Mr. B. Kusterer, 39 Bronx Ave., Bridgeport, Conn.; Secretary-Treasurer, Mr. T. H. Chamberlain, 859 Orange St., New Haven, Conn.; Librarian, Mr. H. Braun; Sergeant-at-Arms, Mr. John C. Barry. Board of Managers: Mr. John Oberender, Mr. W. G. Stratton, Mr. W. Thompson. Delegates to National Convention: Mr. R. J. O'Connor, Mr. G. Wagstaff, Mr. W. Bridgett. Alternates: Mr. W. Ehrencrona, Mr. A. Seafahrt, Mr. B. Kusterer.

Installation of officers will take place on June 5, at Ray O'Connor's "Barn." At the same time a get-together party of the Chemistry Class and the members will be held. President Geo. Wagstaff appointed a committee to take care of the refreshments and all that goes with them. Committee appointed, Ray O'Connor, Bill Flaherty, John Slattery and Ben Kusterer.

Chemistry Class: The course in Solution Control will close on Tuesday, May 26th, after a most successful term. Twenty-eight members enrolled in the class and during the 16 weeks it has run, not more than three absentees were recorded. The interest shown by the members has been really gratifying to all those who have given their time and effort to make the class a success. The Secretary was instructed to obtain the opinion of all members as to whether an advanced chemistry course should be started in the fall.

It was voted to present a gift of appreciation to Dr. G. Richard Burns, Yale University, who has so successfully instructed the class. Bob Mooney was appointed a commitee of one, to do the honors.

The Treasurer was instructed to pay all outstanding bills.

Treasurer's report accepted as read.

Albert Jackle, one of our new members, was present and was introduced.

At the end of the meeting Mr. Floyd T. Taylor gave a very interesting talk on the papers dealing with the electro-deposition of metals, presented at the last meeting of the American Electrochemical Society.

He stressed the fact that the subject of Electroplating is becoming an important factor in American industry.

Meeting adjourned at 10:15 p.m.

T. H. CHAMBERLAIN.

DETROIT BRANCH

Detroit Branch held its regular monthly meeting Friday evening, June 5, at the Statler Hotel, President Jos. H. Hansjosten presiding. This being the final session for the summer was well attended. After the regular order of business the question box conducted by Mr. B. F. Lewis was in order.

Question—What makes a cleaner solution (Electric) deposit copper?

Answer—The dirt which the cleaner removes from copper or brass parts carries salts of copper into the cleaner. This copper may be precipitated immediately, or it may remain in solution, depending on the composition of the cleaner. If it remains in solution, it will deposit on work which is cleaned with "direct" current.

Question—What is a good copper cyanide strike solution?

Answer—The composition of a copper strike differs from the usual copper plating solution in that the copper content is low, the free cyanide ratio is high, and the carbonate content is relatively high.

Question—What is a good stripper for tin plate?

Answer—Muriatic acid with a suitable inhibitor to prevent attack of the base metal.

Question—How successful is the new vapor system of cleaning?

Answer—The process known as "Degreasing" is effective in removing all oils, fats and waxes, but does not completely remove solid particles such as tripoli, emery, etc. See "Metal Industry."

Question—What is a good method for plating antimonial lead?

Answer—See paper in "Monthly Review" during 1925.

Question—Is it necessary to copper and nickel plate steel before plating bright chrome?

Answer—Chromium may be deposited bright directly on steel even in comparatively thick deposits.

Question—Where can information be obtained on Rhodium and Palladium plate?

Answer—Metal Ind. Apr. 1931. Also American Electrochemical Society Preprint. See Chemical abstracts in Public Library.

Question—What causes pits in cyanide copper deposit?

Answer—Poor cleaning and high carbonate.

Question—What is a good strip for nickel-copper-nickel?

Answer—Polish off deposit. Comments on this question are requested of "Review" readers.

Question—What objections are there to the use of cadmium as an under coat?

Answer—Subsequent coatings usually blister on cadmium, especially on buffing.

CHAS. M. PHILLIPS, *Secretary-Treasurer.*

Obituary

The untimely death of Mr. Alfred T. Wagner, President of A. T. Wagner Plating Supply Co., who was killed in an automobile accident on Tuesday, May 26, has taken from Detroit Branch a Charter Member and also one of its most ardent workers.

DAYTON BRANCH

The regular monthly meeting of the Dayton Branch of The American Electro-Platers Society was held Saturday, May 2, 1931, at the Y.M.C.A. with Mr. Walter Fraine as the presiding officer. At this meeting the Branch elected its officers for the coming year. They are as follows: President, Thomas Cusick; Vice-President, William Brandt; Secretary-Treasurer, Robt. G. Suman. Board of Managers: Walter Fraine, Harvey Harter, Charles Wesley Abbott. Delegates to Convention: Walter Fraine, Robert G. Suman, Clarence Van Derau. Alternates to Convention: Harold Farber, Thomas Cusick, Charles Wesley Abbott.

A new office was created at this meeting—that of Recording Secretary. The Branch has long felt the need for the same and consequently it was properly brought up at this meeting. Mr. Ward Protsman was elected as Recording Secretary for the coming year.

The regular monthly meeting of the Dayton Branch, A. E. S. was held Saturday evening, June 6, 1931, at the Y. M. C. A. with our newly elected President Thomas Cusick presiding.

Minutes of the previous meeting were read and so approved.

The Secretary read a letter from the Los Angeles Branch in regard to holding the 1932 Convention of the Society in that city.

A motion was made and seconded that the regular meeting for July be suspended, but the kind invitation of our fellow-member Mr. Clarence Folz of 2830 Salem Ave. to hold our August meeting at his home was very graciously accepted. We will resume our regular meetings at the Y. M. C. A. the first Saturday in September.

It was also reported that the Chemical Control Class that was so enthusiastically attended last winter, would start its course beginning the second Saturday in September.

It was decided to have a question box, whereby the members may put their questions or Plating problems in writing, the same to be taken care of by the Librarian, and read before the open meeting, however, this does not eliminate oral questions.

After the regular business was taken care of the meeting was open for discussion.

The Electro-deposition of Iron was discussed by Mr. Fraine and Mr. Harter, both having had some experience with the same. Tin and Acid Copper solutions also came up for their share of the evening's discussion, after which a motion was made to adjourn at 10 o'clock.

WARD PROTSMAN, *Recording Secretary.*

WORCESTER BRANCH

It is so seldom that the Worcester Branch has a meeting that it is quite an occasion. I am pleased to be able to report that we had a very successful one last Friday evening. So much by way of introduction. The rest may be suitable for printing.

The Worcester Branch held its May meeting on Friday evening, May 22 in the rooms of the Chamber of Commerce. There were fourteen members

of the Worcester Branch and twenty-two visitors present. The meeting was called to order at 8:15 by the President, Mr. Marshall, who first called upon Mr. Frommann, Chairman of the Educational Committee. Mr. Frommann stated that, in spite of the lack of success during the past winter, another attempt would be made to run a class in solution analysis this fall. The meeting was then turned over to Mr. George B. Hogaboom, who first told of several incidents where a knowledge of solution analysis had paid well for the time and trouble spent in getting it. Mr. Hogaboom then gave a very interesting talk about nickel plating solutions, tracing their development from the one patented in 1869 by Isaac Adams to the present day solutions working at comparatively high temperatures and high current densities. Most of his talk dealt with the effect of addition agents. He distributed charts prepared by the Research Laboratory of the General Motors Corp. showing the ranges in which a satisfactory plate can be obtained when various conditions are changed. Mr. Hogaboom answered questions on various subjects, the discussion lasting until eleven o'clock when the building closed.

I hope that I shall have the opportunity to send you another report before the summer season sets in.

ROGER H. BRYANT, *Secretary.*

NEWARK BRANCH

The regular meeting of the Newark Branch held on the date at Franklin Hall, 41 Franklin St., Newark, N. J. The newly elected officers having been installed in previous meeting by Mr. Philip Severing are as follows: Mr. William Harrison, President; Mr. Austin Fletcher, Vice-President; Mr. George Reuter, Secretary-Treasurer; Mr. Paul Oldern, Educational Secretary; Mr. Frank Dressel, Sergeant-at-Arms. Trustees: Mr. George Wagner, Mr. Samuel Glickenhaus, Mr. A. Calabrese. Delegates to Convention: Mr. Horace Smith, Mr. Oliver J. Sizelove, Mr. Philip Sievering. Alternates to Convention: Mr. W. Wodicker, Mr. A. Calabrese, Mr. W. Harrison.

The newly elected officers occupy their positions and as this meeting was the last to be held at Franklin Hall, due to tearing the building down and those in the vicinity for the new postoffice, a farewell meeting was held with refreshments being served at the end of the meeting. A large delegation of members of New York Branch was on hand to help the Newark Boys sigh in leaving this meeting place and sang till the early hours of the morning all popular airs of the day.

The speaker of the evening was Mr. Lewis Graham, a member of Newark Branch, his subject being "Electrical Kinks" and Mr. Lewis Graham surely showed us not one but many ways of handling electrical trouble and answered questions of electrical nature. This talk was indeed educational to the plater and the speaker was given a rising vote of thanks.

Motion made and carried that Newark Branch will meet only once a month during July and August. The new meeting room will be located in the Newark Elks Club, Broad St., Newark, N. J. All Platers and members take notice.

GEORGE REUTER, *Secretary.*

APPLICATIONS

	Branch
Samuel Glin, 479 So. 22 St., Newark, N. J.	Newark
Oliver J. Fraser, International Metal Co., Bayonne, N. J. (Assoc.)	Newark
Frank E. England, 145 Delavan Ave., Newark, N. J. (Assoc.)	Newark
R. N. Shaffue, 7308 34th St., Kenosha, Wis.	Milwaukee
Fred H. Whipple, 217 W. Jackson Street, Muncie, Indiana	Anderson
Ralph L. Seabury, c/o Delco-Remy Corp., Anderson, Indiana	Anderson
Everett L. Butler, 2003 W. 8th St., Muncie, Indiana	Anderson
Minton R. Lorce, 201 Riverside Ave., Muncie, Indiana	Anderson
George A. Kain, Jr., 1911 Fulton St., Chicago, Illinois	Chicago
Chas. H. Craig, 10722 Wentworth Ave., Chicago, Illinois	Chicago
Wm. Ream, R. F. D. No. 1, Flint, Michigan	Detroit
A. W. Carter, 955 Hayes Ave., E. Hazel Park Borough, Detroit	Detroit
Frank Ver Plank, Zeeland, Michigan	Grand Rapids
John Yengling, 10 Chestnut St., Philadelphia, Pa. (Assoc.)	Philadelphia
E. B. Sanigar, 5042 Stenton Ave., Philadelphia, Pa. (Assoc.)	Philadelphia
H. M. Writer, Third & Segley Ave., Philadelphia, Pa. (Assoc.)	Philadelphia
Jesse E. Quimbly, 1816 Kinsey Avenue, Philadelphia, Pa.	Philadelphia
Karl F. Debler, 833 Arch Street, Philadelphia, Pa.	Philadelphia
Wallace A. Keefe, 144 Camp Street, Jamestown, N. Y.	Rochester
C. J. Restivo, 130 Hayes Street, San Francisco, Cal.	San Francisco
F. W. Huntington, Y. M. C. A., Oakland, California	San Francisco
Walter Shelter, 726 Macon St., Brooklyn, N. Y. (Active)	New York

ELECTIONS

FRED W. WHIPPLE, 217 W. Jackson St., Muncie, Indiana.....Anderson

RALPH L. SEABURY, c/o Delco-Remy Corp., Anderson, Indiana....Anderson

EVERETT L. BUTLER, 2003 W. 8th St., Muncie, Indiana.....Anderson

MINTON R. LORCE, 201 Riverside Ave., Muncie, Indiana... .....Anderson

GEORGE A. KAIN, JR., 1911 Fulton St., Chicago, Illinois.....Chicago

CHAS. H. CRAIG, 10722 Wentworth Avenue, Chicago, Illinois.....Chicago

WM. REAM, R. F. D., No. 1, Flint, Michigan.....Detroit

A. W. CARTER, 955 Hayes Ave., E. Hazel Park Br., Detroit.....Detroit

FRANK VER PLANK, Zeeland, Michigan.....Grand Rapids

F. H. SLATER, 1819½ N. Western Ave., Los Angeles, Cal.....Los Angeles

JAMES L. DYE, 145 W. 93rd St., Los Angeles, Cal.....Los Angeles

KARL F. DEBLER, 833 Arch St., Philadelphia, Pa.....Philadelphia

WALLACE A. KEEFE, 144 Camp St., Jamestown, N. Y.....Rochester

C. J. RESTIVO, 130 Hayes Street, San Francisco, Cal.....San Francisco

F. W. HUNTINGTON, Y. M. C. A., Oakland, California.....San Francisco

SUSPENSIONS

CHAS. QUINGEL, 1406 Vine St., Cincinnati, Ohio.....Cincinnati

ALFRED LAY, 503 Chestnut St., Marrysville, Ohio.....Cincinnati

FRANK POPP, 5235 Ralston Ave., Norwood, Ohio.....Cincinnati

C. STORCH, 3935 Washington Ave., Cincinnati, Ohio.....Cincinnati

G. A. DIX, Wethersfield, Connecticut.....Hartford-Conn.

M. F. FLAVIN, 17 Groveland St., Springfield, Mass.....Hartford-Conn.

C. D. LANE, 20 Walter Street, Springfield, Mass.....Hartford-Conn.

WM. WICKESSER, Ridge Ave. & Noble St., Philadelphia, Pa.....Philadelphia

P. GORING, 155 Roseberry St., Clerkenwell, London, England.....London

JOSEPH OSWALD, 392 East 158 St., New York, N. Y.....New York

JOSEPH SAMPIETRO, 2036 Hendrickson St., Brooklyn, N. Y.....Brooklyn

GEORGE DIETRICH, JR., 2001 Metropolitan Ave., Brooklyn, N. Y..Brooklyn

F. THOMPSON, 2603 Brooklyn Ave., Detroit, Michigan.....St. Louis

CHAS. C. DUVAL, 507 Oakley St., Evansville, Indiana.....St. Louis

A. D. SPINDLER, 12 N. Baker St., Evansville, Indiana.....St. Louis

EUGENE COTE, Gardner, Massachusetts.....Worcester

RESIGNATIONS

R. E. HARING, Moorestown, N. J.....Philadelphia

H. D. WRIGHT, 34 Stateion Street, Newtown, Sydney, N. S. W., Australia, Philadelphia

C. H. BROWN, 66 Indiana St., Valparaiso, Indiana.....Chicago

A. G. MUSICK, 1522 Chestnut St., St. Louis, Mo.....St. Louis

ALEX METHEVIER, San Francisco, Cal.....San Francisco

TRANSFERS

A. L. SLATER,.....From Chicago Branch to St. Louis

T. E. ELWIN.....From Hartford-Connecticut Valley to Waterbury

DEATHS

A. T. WAGNER.....Charter member of Detroit Branch, May 26, 1931

ANDERSON BRANCH

Meets first Monday of every month at 7:30 p.m. at the Anderson Indiana Y. M. C. A. R. M. Wagner, Secretary-Treasurer, 28 W. 12th St., Anderson, Indiana.

BALTIMORE-WASHINGTON

Meets in Enoch Pratt Library, Calhoun and Hollis Sts., Irvin H. Hahn, Secretary, 207 S. Sharp St., Baltimore, Maryland.

BOSTON

Meets at American House, Boston, Mass. First Thursday each month. Secretary A. W. Garrett, 45 King St., Dorchester, Mass.

BRIDGEPORT

Meets first and third Friday of each month at Chamber of Commerce Rooms, Stratfield Hotel. Secretary, T. H. Chamberlain, 859 Orange St., New Haven, Conn.

CHICAGO

Meets second Saturday of each month, at 8 p. m., Atlantic Hotel, 316 S. Clark St., Secretary, J. C. Kretschmer, 1914 Warner Ave.

CINCINNATI

Meets every Thursday, 7:30 p. m., at Vocational Training School, Spring and Liberty Sts. Secretary, Al Yeager, 2021 Sherman Ave., Norwood, Ohio.

CLEVELAND

Meets first Saturday of each month at Hotel Winton, Paul R. Stamm, Secretary, 947 Elbon Road, Cleveland Heights, Ohio.

DAYTON

Meets first Saturday of each month at the Y. M. C. A., Dayton, Ohio. Secretary, Robert G. Suman, 2734 Ridge Road, Dayton, Ohio.

DETROIT

Meets the first Friday of each month at the Hotel Statler, Louis II Room. Secretary, Chas. M. Phillips, 18933 Hickory Ave., Detroit, Mich.

GRAND RAPIDS

Meets second Friday of each month at 528 Lake Michigan Drive, N. W. Secretary, Jacob Van Dyke, 1361 Union Ave., N. E., Grand Rapids, Mich.

HARTFORD-CONNECTICUT VALLEY

Meets fourth Monday in each month alternately at the Chamber of Commerce 815 Main St., Hartford and the Chamber of Commerce 134 Chestnut St., Springfield. Secretary, Vernon Grant, 32 Jennings Road, Bristol, Conn.

INDIANAPOLIS

Meets second Saturday of each month at Hotel Denison. Secretary, Louis Mertz, 1725 Union St., Indianapolis, Ind.

LOS ANGELES

Meets second Wednesday of each month at the Chamber of Commerce Bldg., 9th floor, 1151 S. Broadway. Secretary, M. D. Rynkofs, 1354 W. 25th St., Los Angeles, Calif.

MILWAUKEE

Meets second and fourth Thursdays of each month at Cor. 3rd and Highland Ave. J. N. Hock, 3011 N. 24th Place, Milwaukee, Wis.

MONTREAL

Meets second and fourth Friday of each month at 1437 Aylmer St. Montreal, Quebec, Canada, where the Secy-Treas. Mr. Charles Doherty, can be found at any time.

NEWARK

Meets first and third Fridays of each month at Franklin Hall, 41 Franklin St., Newark, N. J., at 8 p. m. Secretary-Treasurer, Geo. Rueter, P. O. Box 201, Newark, N. J.

NEW YORK

Meets second and fourth Fridays of each month in the World Building, Park Row, New York City, N. Y. Secretary-Treasurer, J. E. Sterling, 2581 46th St., Astoria, L. I.

PHILADELPHIA

Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. Secretary, J. E. Underwood, 327 N 10th St., Camden, N. J.

PITTSBURGH

Meets first Friday of each month at 8 p. m., at downtown branch, Y. M. C. A. Secretary, S. E. Hedden, 227 Fifth St., Aspinwall, Pa.

PROVIDENCE-ATTLEBORO

Meets first and third Thursday of each month at 44 Washington St., Prov. Engineers Rooms, Providence, R. I. Secretary, J. H. Andrews, 19 Rosedale St., Providence, R. I.

ROCHESTER

Meets third Friday of each month at Hotel Seneca. Secretary, Chas. Griffin, 24 Garson Ave., Rochester, N. Y.

SAN FRANCISCO BRANCH

Meets at Plaza Hotel, San Francisco. Secretary, H. W. McKibben, 310 Tehama St., San Francisco, Cal.

ST. LOUIS

Meets second Friday of each month at the Plant of the Lasalco Co., 2828 LaSalle St. Secretary, C. T. McGinley, 8214 Fairham Ave., University City, Mo.

TOLEDO

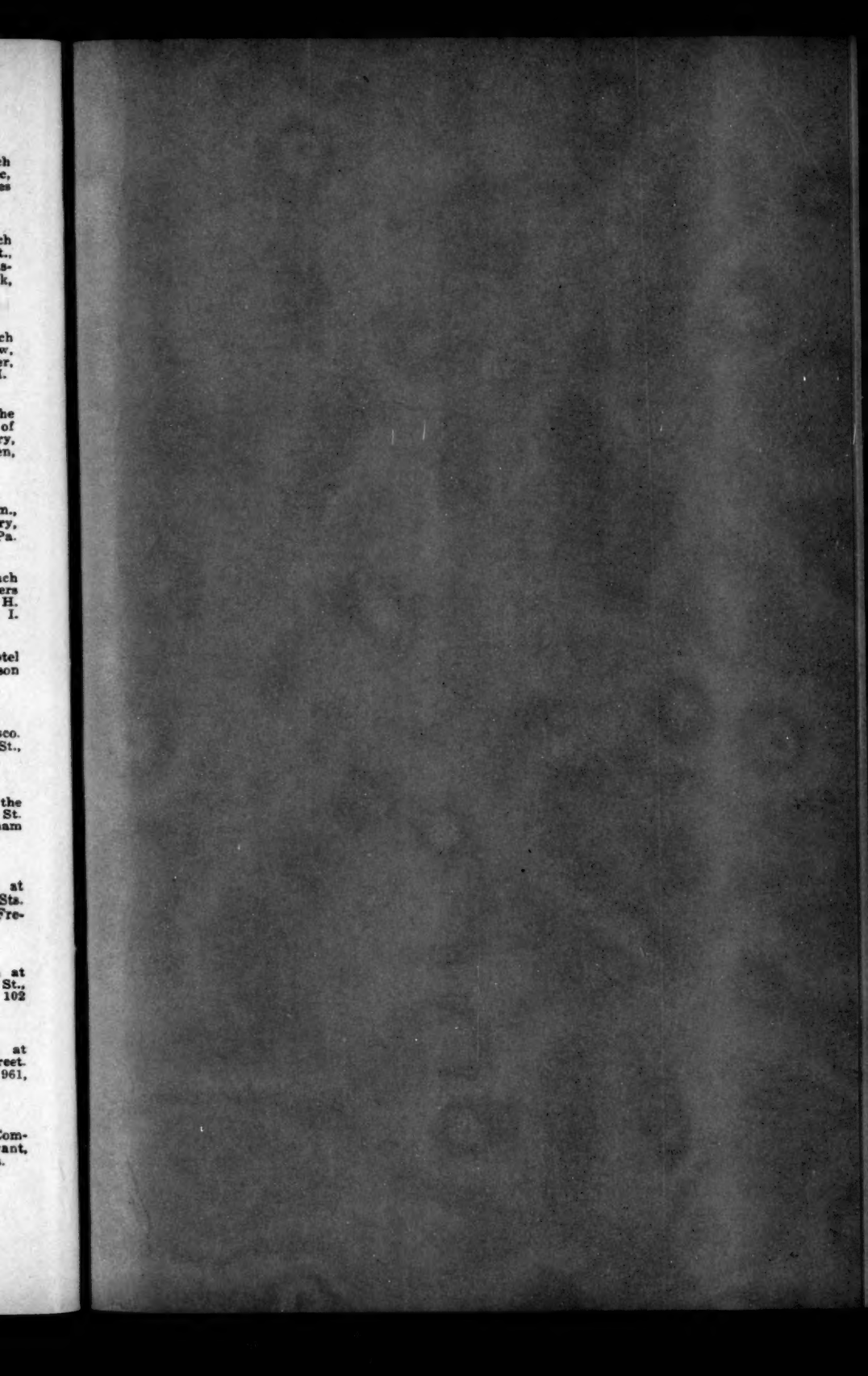
Meets first Thursday of each month at Toledo Secor Hotel, Cherry and Page Sts. James M. Lee, Secretary, Barker Street, Fremont, Ohio.

TORONTO

Meets fourth Monday of each month at Canadian Foresters' Hall, 22 College St., Room No. 2. Secretary, H. W. Graham, 102 Robina Ave., Toronto, Canada.

WATERBURY

Meets second Friday of the month at Engineers Hall, No. 11 East Main Street. Wm. F. Guilfoile, Secretary, P. O. Box 961, Waterbury, Conn.

WORCESTER

Meets Directors' Room, Chamber of Commerce, Worcester, Mass. Roger H. Bryant, Secretary, 94 Grove St., Worcester, Mass.